

Notice of Allowability

Application No.

09/823,403

Examiner

Aimee J. Li

Applicant(s)

BURCH, CARL D.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to RCE and Amendment filed 13 October 2004.
2. ☒ The allowed claim(s) is/are 1, 3-6, 10, 12-15, 19, and 21-26 renumbered as 1-17.
3. ☒ The drawings filed on 30 March 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Tuan Ngo (Reg. No. 44,259) on 11 August 2005 and 15 August 2005.

3. The application has been amended as follows:

- a. With regards to the specification, please amend page 16, lines 24-25 with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

... Computer-readable media may be, for example, storage media such as a
floppy disk, a hard disk, a zip-drive cartridge...

- b. With regards to claim 1, renumbered as claim 1, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

A method for retiring a first instruction[[s]] processed through various
processing stages, comprising the steps of:

Processing a second instruction different from the first instruction;

Processing the first instruction until the first instruction meets the criteria
for early retirement;

Indicating that the first instruction has met the early-retirement criteria;

Processing the first instruction to a desirable stage, and at which, based on an indication that the first instruction has met the early-retirement criteria, terminating the first instruction out of order of a program running the first instruction; and

Updating a state of a system processing the first instruction to reflect that the first instruction has been terminated;

Wherein the early retirement criteria is met when processing the second instruction ~~causes that~~ results in continued processing of the first instruction ~~does not~~ changing ~~change~~ an architectural state of the system processing the first instruction, and, at the time of termination, the first instruction has completed its function without completing its full pipeline.

- c. With regards to claim 3, renumbered as claim 3, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

The method of claim 1 wherein the step of indicating comprises ~~the step of~~ generating a signal associated with the first instruction.

- d. With regards to claim 10, renumbered as claim 9, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

A computer-readable storage medium storing ~~embodying~~ instructions that cause a computer to perform a method for retiring a first instruction[[s]]

processed through various processing stages, the method comprising the steps of:

Processing a second instruction different from the first instruction;

Processing the first instruction until the first instruction meets the criteria for early retirement;

Indicating that the first instruction has met the early-retirement criteria;

Processing the first instruction to a desirable stage, and at which, based on an indication that the first instruction has met the early-retirement criteria, terminating the first instruction out of order of a program running the first instruction; and

Updating a state of a system processing the first instruction to reflect that the first instruction has been terminated;

Wherein the early-retirement criteria is met when processing the instruction ~~causes that results in continued processing of the first instruction does not changing~~ ~~change~~ an architectural state of the system processing the first instruction, and, at the time of termination, the first instruction has completed its function without completing its full pipeline.

- e. With regards to claim 12, renumbered as claim 10, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

The computer-readable storage medium of claim 10 wherein the step of indicating comprises the step of generating a signal associated with the first instruction.

- f. With regards to claims 13-15, renumbered as claim 11-13, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

The computer-readable storage medium of claim...

- g. With regards to claim 19, renumbered as claim 14, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

A system for retiring a first instruction[[s]] processed through various processing stages, comprising ~~at least one means for~~:

A first processing means for processing a second instruction different from the first instruction;

A second processing means for processing the first instruction until the first instruction meets the criteria for early retirement;

A third processing means for processing the first instruction to a desirable stage, and at which, based on an indication that the first instruction has met the early-retirement criteria, terminating the first instruction out of order of a program running the first instruction; and

An updating means for updating a state of the system to reflect that the first instruction has been terminated;

Wherein the early-retirement criteria is met when processing the instruction ~~causes that~~ results in continued processing of the first instruction ~~does not changing~~ ~~change~~ an architectural state of the system processing the first instruction, and, at the time of termination, the first instruction has completed its function without completing its full pipeline.

- h. With regards to claim 24, renumbered as claim 15, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

A method for retiring an instruction processed through various processing stages, comprising the steps of:

Processing the instruction until the instruction meets ~~[[the]]~~ criteria for early retirement;

Indicating that the instruction has met the early-retirement criteria;

Processing the instruction to a desirable stage, and at which, based on an indication that the instruction has met the early-retirement criteria, terminating the instruction out of order of a program running the instruction; and

Updating a state of a system processing the instruction to reflect that the instruction has been terminated;

Wherein the early-retirement criteria is met when the instruction is identified as

Performing a logical OR of a register with the same register, writing a value 0 from a register into the same register, or writing a value to a register hardwired to a predetermined value~~[[.]], and~~
At the time of termination, the instruction has completed its function without completing its full pipeline.

- i. With regards to claim 26, renumbered as claim 17, please amend with the following changes denoted with strikethroughs or double brackets for deletions and underlines for additions.

A method for retiring early a NO-OP instruction that is scheduled to be processed through various processing stages, the method comprising the steps of:

Evaluating an op-code of an instruction to determine whether the instruction is the NO-OP instruction, and, if so, using a tag to indicate that the NO-OP instruction has met ~~[[the]]~~ early-retirement criteria;
Processing the NO-OP instruction to a desirable stage, and at which, based on the indication that the NO-OP instruction has met the early-retirement criteria, terminating the NO-OP instruction out of order of a program running the NO-OP instruction; thereby skipping processing the NO-OP instruction in at least one of the processing stages; and
Updating a state of a system processing the NO-OP instruction to reflect that the NO-OP instruction has been terminated~~[[.]]~~; and

Wherein the early-retirement criteria is met when, at the time of termination, the NO-OP instruction has completed its function without completing its full pipeline.

REASONS FOR ALLOWANCE

4. The following is an examiner's statement of reasons for allowance: The prior art searched contained early-retirement pipelines and out of order processing, however, they did not contain teachings regarding when early-retirement criteria is met as claimed in the claims. For example, claim 1 recites that the early-retirement criteria is met when both of the following conditions are true: a second instruction causes a first instruction's continued processing to not change the system's architectural state and the first instruction has completed its function without completing the full pipeline when it is being terminated. This combination of conditions is not taught in the prior art searched. Claims 10 and 19 have similar limitations. Claim 24, as amended above, includes the limitation that "early-retirement criteria is met when the instruction is identified as performing a logical OR of a register with the same register, writing a value 0 from a register into the same register, or writing a value to a register hardwired to a predetermined value, and, at the time of termination, the instruction has completed its function without completing its full pipeline." This limitation has not been taught in the prior art searched, namely that the instruction must be one of the instruction types identified in the claim limitation, i.e. an OR instruction of a register with itself, writing a 0 from a register to itself, or writing a predetermined value into a hardwired register, and that it completed its function without completing the pipeline. Claim 26, as amended above, is specifically applicable to NO-OP instructions and includes the limitation that the early-retirement criteria is met when the NO-

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OP instruction has completed its function without completing the pipeline. Prior art searched has taught NO-OP instruction, or its equivalent, such as a bubble or stall, is already present in the instruction execution or it is added into the instruction execution to maintain synchronization, clocking, data coherency, etc. In each of these cases, the NO-OP instruction is processed by the full pipeline, so it does not meet the last limitation of the NO-OP instruction completing its function without completing the full pipeline.

5. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aimee J. Li whose telephone number is (571) 272-4169. The examiner can normally be reached on M-T 7:30am-5:00pm.

7. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Chan can be reached on (571) 272-4162. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.


8. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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AJL

Aimee J. Li

17 August 2005



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